

Recent Updates on Prevention and Recovery Networks for Indonesia Natural Disasters based on the Internet-of-Things (PATRIOT-Net)

Khoirul Anwar^{1,2}, Achmad Ali Muayyadi², Muhammad Ary Murti², Ekki Kurniawan², Ratna Mayasari², Budi Syihabuddin², Nachwan Mufti Adriansyah², Ramdhan Nugraha², Unang Sunarya², Sony Sumaryo², Yan Syafri Hidayat³, Rico Candra Negoro⁴

¹Center for Advanced Technologies (AdWiTech), Deli Building, Telkom University, Bandung, 40257 INDONESIA

²School of Electrical Engineering, Telkom University, Jl. Telekomunikasi No. 1, Terusan Buah Batu, Bandung, 40257 INDONESIA

³P.T. FUSI Global Technology, Bandung, INDONESIA

⁴Padang City, BPBD, Padang, 33322 INDONESIA

E-mail: anwarkhoirul@telkomuniversity.ac.id

Abstract—This paper reports the recent updates of Prevention and Recovery Networks for Indonesia Natural Disasters based on the Internet-of-Things (PATRIOT-Net) for the first year of total three years. The PATRIOT-Net project is targeting on 7 outcomes: (i) optimal high dense internet of things (IoT) networks, (ii) network coding algorithm for heterogeneous sensors and applications, and (iii) optimal routing algorithm, (iv) new IoT devices, (v) mobile cognitive radio base station (MCRBS), (vi) apps, (vii) monitoring room.

Index Terms—Internet-of-things, network coding, mobile cognitive radio base station, 2G, 3G, 4G, 5G.

I. INTRODUCTION AND SYSTEM MODEL

This Prevention and Recovery Networks for Indonesia Natural Disasters based on the Internet-of-Things (PATRIOT-Net) project is highly motivated by four disasters occurring in Indonesia with high probability. The four disasters including the map of sensors in Padang city is shown in Fig. 1, which are (i) earthquake, (ii) tsunami, (iii) landslide, and (iv) flooding.

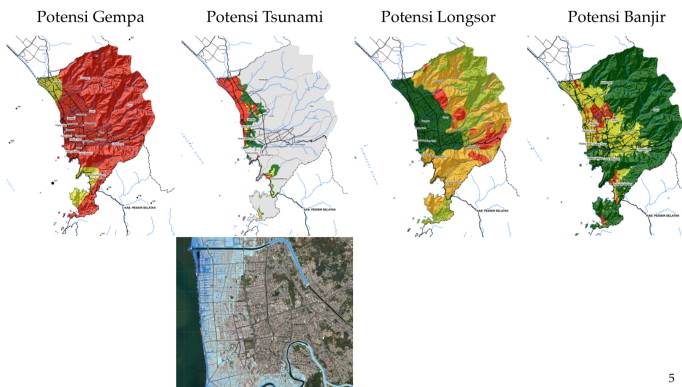


Fig. 1. Map of Padang city for sensor locations used to mitigate four disasters occurring with high probability in Indonesia.

The PATRIOT-Net project proposes solution using two networks: (i) prevention networks and (ii) recovery networks, as shown in Fig. 3. The prevention network collect regularly updated information from the environment, while the recovery networks tries to recover the destroyed network infrastructures. This PATRIOT-Net project proposes to recover the network using mobile cognitive radio base station (MCRBS), which is extendable using drone.¹

II. RECENT RESULTS AND CONCLUSIONS

The outcomes of this project is shown in Fig. 2, where in total of seven outcomes are expected for duration of three years. In Year I, we have completed realization of antenna of MCBS. We have also completed the theory of IoT under high-dense networks.

This research is supported in part by the LPDP RISPRO under the project PATRIOT-Net, 2018–2021.

¹However, drone applications is out-of-the scope of this PATRIOT-Net project.

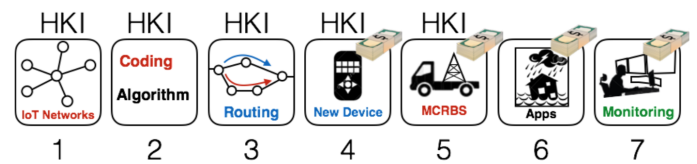


Fig. 2. The seven outcomes of PATRIOT-Net.

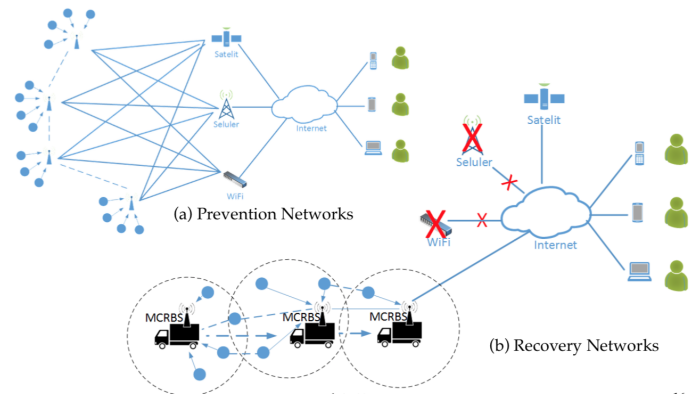


Fig. 3. Prevention and recovery network structure in PATRIOT-Net.

In the Year I, we have many results, e.g. (i) raptor coding scheme in IEEE WPMC 2018 [1] (ii) network coding in IEEE WPMC 2018 [2], (iii) benefit of coded random access in ISITIA 2018 [3], (iv) routing algorithm in ICELTICS 2018 [4], and (v) antenna design in ICT-RuDev 2018 [5].

In the Year I, we have reached several milestone ready to be reported in the mid-term report of Year I.

REFERENCES

- [1] F. N. Hidayah, N. M. Adriansyah, and K. Anwar, "Regular raptor codes based on ldgm with optimal degree distribution for internet of things," in *The 21st International Symposium on Wireless Personal Multimedia Communications (WPMC-2018)*, Chiang Rai, Thailand, Nov. 2018.
- [2] H. Prakoso, I. N. A. Ramatryana, and K. Anwar, "Lt-like network coding scheme for wireless iot super-dense networks without feedback," in *The 21st International Symposium on Wireless Personal Multimedia Communications (WPMC-2018)*, Chiang Rai, Thailand, Nov. 2018.
- [3] F. M. Pasalbessy and K. Anwar, "Analysis of internet of things (iot) networks using extrinsic information transfer (exit) chart," in *International Seminar on Intelligent Technology and Its Applications (ISITIA)*, Sanur, Bali, August 2018.
- [4] S. Hartinah, H. Prakoso, and K. Anwar, "Routing of mobile cognitive radio base station for disaster recovery networks," in *IEEE 2018 International Conference on Electrical Engineering and Informatics (ICELTICS)*, Banda Aceh, Indonesia, 2018.
- [5] D. A. Sujiansyah, B. Syihabuddin, K. Anwar, and N. M. Adriansyah, "Antenna design for multi-generation of 2g5g for rural area wireless communications," in *International Conference on ICT for Rural Development 2018*, Bali, Indonesia, October 2018.